REPLACEMENT SHEET

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[0001]MULTI USER DETECTION USING EQUALIZATION AND SUCCESSIVE INTERFERENCE CANCELLATION

[0002] CROSS REFERENCE TO RELATED APPLICAITON(S)

[0003] This application claims priority from U.S. Provisional Application No. 60/451,591, filed March 3, 2003, which is incorporated by reference as if fully set forth.

[0004] FIELD OF INVENTION

[0005] The invention generally relates to wireless communication systems. In particular, the invention relates to detection of multiple user signals in a wireless communication system.

[0006] BACKGROUND

[0007] A typical wireless communication system includes base stations which communicate with wireless transmit/receive units (WTRUs). Each base station has an associated operational area where it communicates with WTRUs which are in its operational area. In some communication systems, such as code division multiple access (CDMA), multiple communications are sent over the same frequency spectrum. These communications are typically differentiated by their codes.

[0008] Since multiple communications may be sent in the same frequency spectrum and at the same time, a receiver in such a system must distinguish between the multiple communications. One approach to detecting such signals is matched filtering. In matched filtering, a communication sent with a single code is detected. Other communications are treated as interference. To detect multiple codes, a respective number of matched filters are used. These signal detectors have a low complexity, but can suffer from multiple access interference (MAI) and inter-symbol interference (ISI).

[0017] Figure 4 is a flow chart for an EQ-SIC receiver.

[0018] DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0019] The preferred implementation of the preferred embodiments is in a frequency division duplex (FDD) mode of the third generation partnership project (3GPP) wideband code division multiple access (W-CDMA) communication system. However, the preferred embodiments can be applied to a variety of wireless communication systems.

[0020] The preferred embodiments can be utilized at a wireless transmit/receive unit (WTRU) or a base station. A WTRU includes but is not limited to a user equipment, mobile station, fixed or mobile subscriber unit, pager, or any other type of device capable of operating in a wireless environment. A "base station" includes but is not limited to a base station, Node B, site controller, access point or other interfacing device in a wireless environment. Additionally, the preferred embodiments can be applied to WTRUs communicating with each other.

[0021] Figure 1 is a simplified diagram of a preferred equalization/successive interference cancellation (EQ-SIC) receiver. Preferably, most of the components shown in Figure 1, excluding the antenna 20, are implemented as a single integrated circuit. Alternately, the individual components can be discrete components or a mixture of integrated circuit(s) and/or discrete components.

[0022] Multiple communications are received by an antenna 20 or antenna array of the receiver. A sampling device 22, such as a single or multiple analog to digital converters (ADCs), samples the received signal to produce a received vector, $\underline{r}$.

[0023] The received vector is processed by a segmentation device 24 to produce segments, $\underline{r}_1 \ldots \underline{r}_S$ of the received vector $\underline{r}$. Figure 2 is an illustration of a preferred segmentation scheme, although others may be used. As illustrated in Figure 2, the received vector $\underline{r}$ is separated into a plurality of segments, $\underline{r}_1 \ldots \underline{r}_S$. Preferably, the segments overlap as shown. The amount of the overlap is preferably twice the length